

DEPARTMENT OF THE ARMY
Omaha District, Corps of Engineers
106 South 15th Street
Omaha, Nebraska 68102-1618

:NOTICE: Failure to acknowledge : Solicitation No. DACA45 03 R 0018
:all amendments may cause rejec- :
:tion of the offer. See FAR : Date of Issue: 21 JAN 2003
:52.215-1 of Section 00100 : Date of Receiving Proposals:
25 FEB 2003

Amendment No. 0004
18 February 2003

SUBJECT: Amendment No. 0004 to specification and drawings for Construction of
**ADAL SBIRS MISSION CONTROL STATION (MCS), CRWU 03-3001, BUCKLEY AFB,
COLORADO.**

Solicitation No. DACA45 03 R 0018.

TO: Prospective Offerors and Others Concerned

1. The specifications and drawings for subject project are hereby modified as follows (revise all specification indices, attachment lists, and drawing indices accordingly).

a. Specifications. (Descriptive Changes.)

(1) Section 00110, Page 4, paragraph 2 (d), item (10) Rating, delete definitions for "Marginal" and "Unacceptable" in their entirety and delete text at end of paragraph reading "For Tab 2, Past Performance ... an adjectival rating as shown above." and substitute:

"Marginal. Barely meets solicitation requirements of the factor or sub-factor requirements of Paragraph 6 of this Section. The Government may still receive benefit from the proposal submitted. Any deficiencies noted are correctable without major revision of the proposal.

Unacceptable. Fails to meet one or more of the factor or sub-factor requirements of Paragraph 6 of this Section. The Government would not receive benefit from the proposal submitted. The deficiencies noted are uncorrectable without a major revision of the proposal.

For Past Performance a neutral rating will be awarded when no past performance records are provided or otherwise available. The Federal Acquisition Regulation (FAR) 15.305(a)(2)(iv) states, 'In the case of an offeror without a record of relevant past performance or for whom information on past performance is not available, the offeror may not be evaluated either favorably or unfavorably on past performance.'

(2) Section 16403A, Page 15, paragraph 2.6.2 (Bus), lines 7 and 8, delete the 5th sentence of the paragraph reading "The buses shall be insulated for not less than 600 volts."

(3) Section 16415A, Page 18, paragraph 2.3 (TRANSIENT VOLTAGE SURGE PROTECTION), line 2, after "Sheet E5.01.", add the following sentence:

"Surge current rating shall be 160 kAmps per phase."

b. Specifications (New). Add specification pages as noted below. The pages are issued with this amendment.

Pages Added

Section 02811a, Page 1 thru 15

c. Drawings (New). The following new sheets of drawing code AF 610-90-06 dated 18 February 2003 are hereby added to the contract drawings and are issued with this amendment. (These sheets are included on web site <http://ebs-nwo.wes.army.mil/>).

(1) Sheets L1.01, L1.02, and L1.03.

2. This amendment is a part of the proposing papers and its receipt shall be acknowledged on the Standard Form 1442. All other conditions and requirements of the specifications remain unchanged. If the proposals have been mailed prior to receiving this amendment, you will notify the office where proposals are received, in the specified manner, immediately of its receipt and of any changes in your proposal occasioned thereby.

a. Hand-Carried Proposals shall be delivered to the U.S. Army Corps of Engineers, Omaha District, Contracting Division (Room 301), 106 South 15th Street, Omaha, Nebraska 68102-1618.

b. Mailed Proposals shall be addressed as noted in Item 8 on Page 00010-1 of Standard Form 1442.

3. Offers will be received until 2:00 p.m., local time at place of receiving proposals, 25 FEB 2003.

Attachments:

Spec Pages listed in 1.b. above

Dwgs. listed in 1.c. above

U.S. Army Engineer District, Omaha
Corps of Engineers
106 South 15th Street
Omaha, Nebraska 68102-1618

18 February 2003
DRL/4547

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SECTION 02811A

UNDERGROUND SPRINKLER SYSTEMS

06/01

PART 1 GENERAL

Complete irrigation system design and construction to irrigate all sodded lawns, trees, shrubs, groundcovers where indicated on the drawings. All irrigation heads, nozzles, valves, and controllers shall be of the same manufacturer.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 53/A 53M	(1999b) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 183	(1983; R 1998) Carbon Steel Track Bolts and Nuts
ASTM A 536	(1984; R 1999e1) Ductile Iron Castings
ASTM B 32	(1996) Solder Metal
ASTM B 43	(1998) Seamless Red Brass Pipe, Standard Sizes
ASTM B 88M	(1999) Seamless Copper Water Tube (Metric)
ASTM D 1785	(1999) Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2000	(1999) Rubber Products in Automotive Applications
ASTM D 2241	(2000) Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D 2464	(1999) Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2466	(1999) Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D 2564	(1996a) Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D 2774	(1994) Underground Installation of Thermoplastic Pressure Piping

ASTM D 2855 (1996) Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings

ASTM F 441/F 441M (1999) Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80

ASME INTERNATIONAL (ASME)

ASME B1.2 (1983; R 1991; Errata May 1992) Gages and Gaging for Unified Inch Screw Threads

ASME B16.3 (1998) Malleable Iron Threaded Fittings

ASME B16.15 (1985; R 1994) Cast Bronze Threaded Fittings Classes 125 and 250

ASME B16.18 (1984; R 1994) Cast Copper Alloy Solder Joint Pressure Fittings

ASME B16.22 (1995; B16.22a1998) Wrought Copper and Copper Alloy Solder Joint Pressure Fittings

ASME B40.1 (1991) Gauges - Pressure Indicating Dial Type - Elastic Element

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

ASSE 1013 (1999) Reduced Pressure Principle Backflow Preventers

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C509 (1994; Addendum 1995) Resilient-Seated Gate Valves for Water Supply Service

AWWA C606 (1997) Grooved and Shouldered Joints

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-51145 (Rev C) Flux, Soldering, Non-Electronic, Paste & Liquid

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)

FCCCHR-01 (1993) Manual of Cross-Connection Control

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-80 (1997) Bronze Gate, Globe, Angle and Check Valves

MSS SP-85 (1994) Cast Iron Globe & Angle Valves Flanged and Threaded Ends

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 2 (1993) Industrial Control and Systems
Controllers, Contactors, and Overload
Relays Rated Not More Than 2,000 Volts AC
or 750 Volts DC

NEMA ICS 6 (1993) Industrial Control and Systems,
Enclosures

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2002) National Electrical Code

PLUMBING AND DRAINAGE INSTITUTE (PDI)

PDI WH 201 (1992) Water Hammer Arresters

1.2 PERFORMANCE REQUIREMENTS

System shall operate with a minimum water pressure of 207kPa at connection to base of the sprinkler head and 25 kPa at the last head in each zone.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Sprinkler System; G-ED

Detail drawings for valves, sprinkler heads, backflow preventers, automatic controllers, emitter heads, and water hammer arresters. Drawings shall include a complete list of equipment and materials, and manufacturer's descriptive and technical literature, performance charts and curves, catalog cuts, and installation instructions. Drawings shall also contain complete wiring and schematic diagrams and any other details required to demonstrate that the system has been coordinated and will function as a unit. Drawings shall show proposed system layout, type and number of heads and emitters, quick coupler valves, zone valves, drain pockets, backflow devices, controllers, and mounting details of controllers. As-built Drawings which provide current factual information showing locations of mains, heads, valves, and controllers including deviations from and amendments to the drawings and changes in the work shall be included.

SD-03 Product Data

Spare Parts;

Spare parts data for each different item of material and equipment specified, after approval of the related submittals and not later than the start of the field tests. The data shall include a complete list of parts and supplies, with current unit prices and source of supply.

Design Analysis and Calculations; G-ED

Design analyses and pressure calculations verifying that system will provide the irrigation requirements for all irrigation zones and sections controlled by valves.

SD-06 Test Reports

Field Tests;

Performance test reports, in booklet form, showing all field tests performed to adjust each component; and all field tests performed to prove compliance with the specified performance criteria, upon completion and testing of the installed system. Each test report shall indicate the final position of control valves.

SD-07 Certificates

SD-10 Operation and Maintenance Data

Sprinkler System;

TWO copies of operation and TWO copies of maintenance manuals for the equipment furnished. One complete set prior to field testing and the remainder upon acceptance. Manuals shall be approved prior to the field training course. Operating manuals shall detail the step-by-step procedures required for system startup, operation, and shutdown. Operating manuals shall include the manufacturer's name, model number, parts list, and brief description of all equipment and their basic operating features. Maintenance manuals shall list routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides. Maintenance manuals shall include piping and equipment layout, simplified wiring and control diagrams of the system as installed, and system programming schedule.

1.4 DELIVERY AND STORAGE

All equipment delivered and placed in storage shall be protected from the weather; excessive humidity and temperature variation; direct sunlight (in the case of plastic or rubber materials); and dirt, dust, or other contaminants.

1.5 FIELD MEASUREMENTS

The Contractor shall verify all dimensions in the field and shall advise the Contracting Officer of any discrepancy before performing the work.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT REQUIREMENTS

2.1.1 Standard Products

Materials and equipment shall be the standard products of a manufacturer who has produced similar systems which have performed well for a minimum period of 2 years prior to bid opening. Equipment shall be supported by a

service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site.

2.1.2 Nameplates

Each item of equipment shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a plate secured to the item of equipment.

2.1.3 Extra Stock

The following extra stock shall be provided: Two sprinkler heads of each size and type, two valve keys for operating manual valves, two wrenches for removing and installing each type of head, two quick coupler keys and hose swivels, and four irrigation controller housing keys.

2.2 PIPING MATERIALS

2.2.1 Copper Tubing and Associated Fittings

Tubing shall conform to requirements of ASTM B 88M , Type K. Fittings shall conform to ASME B16.22 and ASME B16.18, solder joint. Solder shall conform to ASTM B 32 95-5 tin-antimony. Flux shall conform to CID A-A-51145, Type I. Grooved mechanical joints and fittings shall be designed for not less than 862 kPa service and shall be the product of the same manufacturer. Grooved fitting and mechanical coupling housing shall be ductile iron conforming to ASTM A 536. Gaskets for use in grooved joints shall be molded synthetic polymer of pressure responsive design and shall conform to ASTM D 2000 for circulating medium up to 110 degrees C . Grooved joints shall conform to AWWA C606. Coupling nuts and bolts for use in grooved joints shall be steel and shall conform to ASTM A 183.

2.2.2 Red Brass Pipe and Associated Fittings

Pipe shall conform to requirements of ASTM B 43, regular. Fittings shall be Class 250, cast bronze threaded conforming to the requirements of ASME B16.15.

2.2.3 Galvanized Steel Pipe and Associated Fittings

Pipe shall conform to requirements of ASTM A 53/A 53M, Schedule 40. Fittings shall be Class 150 conforming to requirements of ASME B16.3.

2.2.4 Polyvinyl Chloride (PVC) Pipe, Fittings and Solvent Cement

2.2.4.1 PVC Pipe

Pipe shall conform to the requirements of ASTM D 1785, PVC 1120 Schedule 80; or ASTM D 2241, PVC 1120 SDR 21, Class 200.

2.2.4.2 PVC Fittings

Solvent welded socket type fittings shall conform to requirements of ASTM D 2466, Schedule 40. Threaded type fittings shall conform to requirements of ASTM D 2464, Schedule 80.

2.2.4.3 Solvent Cement

Solvent cement shall conform to the requirements of ASTM D 2564.

2.2.5 Dielectric Fittings

Dielectric fittings shall conform to ASTM F 441/F 441M, Schedule 80, CPVC threaded pipe nipples, 100 mm (4 inch) minimum length.

2.3 SPRINKLER AND BUBBLER HEADS

2.3.1 Pop-Up Spray Heads

2.3.1.1 General Requirements

Pop-up spray heads lay flush with housing, then pop up when water pressure 138 kPa is activated in system. The rising member supporting the nozzle shall be identical on full, half, third or quarter pattern sprinklers so that nozzles will be interchangeable. The sprinkler head shall be designed to be adjustable for coverage and flow. The nozzle shall be removable so head does not have to be removed for flushing or cleaning. Nozzle rises a minimum of 100 mm (4 inches) above the body. The body shall be constructed with a 13 mm female thread for installation in a fixed underground pipe system.

2.3.1.2 Pop-Up Sprinkler Heads

Stationary sprinkler heads shall be adjustable coverage and designed for pop-up at a height compatible with ground covers, shrubs, trees or lawns. Nozzles shall be pressure compensating, flood, stream or spray type nozzles specifically designed by the manufacturer for the watering trees, shrubs, groundcovers, and lawns. Stationary sprinkler heads, nozzles, and miscellaneous adapters shall be the same as or approved equal to Toro series 570. Micro spray nozzles are not approved products.

2.3.2 Rotary Pop-Up Sprinklers

Sprinklers shall be capable of covering a 30' radius at 50 psi delivering 7.51 gallons per minute. Sprinkler shall pop-up, have a trajectory of 27 degrees. Construction shall be high impact molded plastic with filter screen, choice of nozzles and have adjustable radius capabilities. Pop-up sprinkler head shall be the same as or approved equal to Toro series 300 or 300XP.

2.3.3 Bubbler Sprinkler Heads

Heads shall be multiple-spray bubbler with adjustable flow and designed for permanent aboveground mounting on risers. Heads shall be the same as or approved equal to Toro series 570 nozzles.

2.4 VALVES

2.4.1 Gate Valves, Less than 80 mm (3 Inches)

Gate valves shall conform to the requirements of MSS SP-80, Type 1, Class 150, threaded ends.

2.4.2 Gate Valves, 80 mm (3 Inches) and Larger

Gate valves shall conform to the requirements of AWWA C509 and have encapsulated resilient wedge, parallel seats, non-rising stems, and open by counterclockwise turning. End connections shall be flanged. Interior

construction of valves shall be bronze including stem containing a maximum 2 percent aluminum and maximum 16 percent zinc.

2.4.3 Angle Valves, Less Than 65 mm (2-1/2 Inches)

Angle valves shall conform to the requirements of MSS SP-80, Type 3, Class 150 threaded ends.

2.4.4 Angle Valves, 65 mm (2-1/2 Inches) and Larger

Angle valves shall conform to the requirements of MSS SP-85, Type II, Class 250 threaded ends.

2.4.5 Quick Coupling Valves

Quick coupling valves shall have brass parts and shall be two-piece unit consisting of a coupler water seal valve assembly and a removable upper body to allow spring and key track to be serviced without shutdown of main. Lids shall be lockable vinyl with spring for positive closure on key removal.

2.4.6 Remote Control Valves, Electrical

Remote control valves shall be solenoid actuated globe valves of 20 to 80 mm (3/4 to 3 inch) size, suitable for 24 volts, 60 cycle, and designed to provide for shut-off in event of power failure. Valve shall be cast bronze or brass or plastic housing suitable for service at 1034 kPa (150 psi) operating pressure with external flow control adjustment for shut-off capability, external plug at diaphragm chamber to enable manual operation, filter in control chamber to prevent valve body clogging with debris, durable diaphragm, and accessibility to internal parts without removing valve from system.

2.4.7 Drain Valves

2.4.7.1 Manual Valves

Manual valves shall conform to requirements of MSS SP-80, Type 3, Class 150 threaded ends for sizes less than 65 mm (2-1/2 inches) and MSS SP-85, Type II, Class 250 ends for sizes 65 mm (2-1/2 inches) and larger.

2.4.7.2 Automatic Valves

Automatic valves shall be brass or plastic, spring loaded ball drip type, Class 150 and threaded ends, designed to close at 18 kPa (6 foot) pressure head with positive seal at 21 kPa (3 psi) pressure or greater and be open to drain at less than 21 kPa (3 psi) pressure.

2.4.8 Pressure Regulating Master Valve

Pressure regulating master valve shall be automatic mechanical self-cleaning, self-purging control system having an adjustable pressure setting operated by a solenoid on alternating current with 0.40 amperes at 24 volts. Valve shall close slowly and be free of chatter in each diaphragm position, have manual flow stem to adjust closing speed and internal flushing, and one inlet tappings capable of being installed as a straight pattern valve. Body shall be cast bronze or brass with removable brass seat serviceable from top without removing valve body from system. Valve shall operate at 1034 kPa (150 psi) working pressure and pilot range

from 70 to 875 kPa (10 to 125 psi).

2.4.9 Backflow Preventers

Reduced pressure principle assemblies shall be tested, approved, and listed in accordance with FCCCHR-01. Reduced pressure principle backflow preventers shall be in accordance with ASSE 1013.

2.4.9.1 Reduced Pressure Type Backflow Preventers

Backflow preventers shall be Class 150 flanged, bronze mounted gate valve and strainer, 304 stainless steel or bronze, internal parts. Total pressure drop through complete assembly shall be a maximum of 70 kPa (10 psi) at rated flow. Piping shall be galvanized steel pipe and fittings. Strainers shall be bronze or brass construction with gasket caps. Units shall have 200-mesh stainless steel screen elements.

2.5 ACCESSORIES AND APPURTENANCES

2.5.1 Valve Keys for Manually Operated Valves

Valve keys shall be 15 mm (1/2 inch) diameter by 1000 mm long, tee handles and keyed to fit valves.

2.5.2 Valve Boxes and Concrete Pads

2.5.2.1 Valve Boxes

Valve boxes shall be cast iron, plastic lockable, or precast concrete for each gate valve, manual control valve and remote control valve. Box sizes shall be adjustable for valve used. Word "IRRIGATION" shall be cast on cover. Shaft diameter of box shall be minimum 130 mm (5-1/4 inches). Cast iron box shall have bituminous coating.

2.5.2.2 Concrete Pads

Concrete pads shall be precast or cast-in-place reinforced concrete construction for reduced pressure type backflow preventers.

2.5.3 Pressure Gauges

Pressure gauges shall conform to requirements of ASME B40.1, single style pressure gauge for water with 115 mm (4-1/2 inch) dial brass or aluminum case, bronze tube, gauge cock, pressure snubber, and siphon. Scale range shall be suitable for irrigation sprinkler systems.

2.5.4 Service Clamps

Service clamps shall be bronze flat, double strap, with neoprene gasket or "O"-ring seal.

2.5.5 Water Hammer Arresters

Water hammer arrester shall conform to the requirements of PDI WH 201; stainless steel construction with an encased and sealed bellows compression chamber.

2.6 AUTOMATIC CONTROLLERS, ELECTRICAL

Controller shall conform to the requirements of NEMA ICS 2 with 120 -volt single phase service, operating with indicated stations, and grounded chassis. Enclosure shall conform to NEMA ICS 6 Type 3R, with locking hinged cover, wall-mounted. Controller shall be programmed for various schedules by setting switches and dials equipped with the following features: A switch for each day of week for two schedules, allowing each station to be scheduled individually as to days of watering; a minute switch for each station with a positive increment range of 0 to 90 minutes OR 10 minutes to 9 hours, set time within one percent; a switch allowing selected schedules to be repeated after each completion of initial watering schedule and allowing each operation to be scheduled throughout a 24-hour day; a circuit breaker for surge protection; and circuit for a 9-volt rechargeable NiCad battery.

PART 3 EXECUTION

3.1 INSTALLATION

Sprinkler system shall be installed after site grading has been completed. Excavation, trenching, and backfilling for sprinkler system shall be in accordance with the applicable provisions of Section 02316a, EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS, except as modified herein.

3.1.1 Trenching

Trench around roots shall be hand excavated to pipe grade when roots of 50 mm diameter or greater are encountered. Trench width shall be 100 mm minimum or 1-1/2 times diameter of pipe, whichever is wider. Backfill shall be hand tamped over excavation. When rock is encountered, trench shall be excavated 100 mm deeper and backfilled with silty sand (SM) or well-graded sand (SW) to pipe grade. Trenches shall be kept free of obstructions and debris that would damage pipe. Subsoil shall not be mixed with topsoil. Existing concrete walks, drives and other obstacles shall be bored at a depth conforming to bottom of adjacent trenches. Pipe sleeves for bored pipe shall be two pipe diameters larger than sprinkler pipe.

3.1.2 Piping System

3.1.2.1 Cover

Underground piping shall be installed to meet the minimum depth of backfill cover specified.

3.1.2.2 Clearances

Minimum horizontal clearances between lines shall be 100 mm for pipe 50 mm (2 inches) and less; 300 mm for 65 mm (2-1/2 inches) and larger. Minimum vertical clearances between lines shall be 25 mm.

3.1.2.3 Minimum Slope

Minimum slope shall be 50 mm per 10 m in direction of drain valves.

3.1.3 Piping Installation

3.1.3.1 Polyvinyl Chloride (PVC) Pipe

a. Solvent-cemented joints shall conform to the requirements of ASTM D 2855.

b. Threaded joints shall be full cut with a maximum of three threads remaining exposed on pipe and nipples. Threaded joints shall be made tight without recourse to wicks or fillers, other than polytetrafluoroethylene thread tape.

c. Piping shall be joined to conform with requirements of ASTM D 2774 or ASTM D 2855, and pipe manufacturer's instructions. Pipe shall be installed in a serpentine (snaked) manner to allow for expansion and contraction in trench before backfilling. Pipes shall be installed at temperatures over 5 degrees C.

3.1.3.2 Soldered Copper Tubing

Pipe shall be reamed and burrs removed. Contact surfaces of joint shall be cleaned and polished. Flux shall be applied to male and female ends. End of tube shall be inserted into fittings full depth of socket. After soldering, a solder bead shall show continuously around entire joint circumference. Excess acid flux shall be removed from tubings and fittings.

3.1.3.3 Threaded Brass or Galvanized Steel Pipe

Prior to installation, pipe shall be reamed. Threads shall be cut in conformance with ASME B1.2. Pipe joint compound shall be applied to male end only.

3.1.3.4 Insulating Joints

Insulating and dielectric fittings shall be provided where pipes of dissimilar metal are joined and at connections to water supply mains as shown.

3.1.3.5 Grooved Mechanical Joints

Grooves shall be prepared according to the coupling manufacturer's instructions. Grooved fittings, couplings, and grooving tools shall be products of the same manufacturer. Pipe and groove dimensions shall comply with the tolerances specified by the coupling manufacturer. The diameter of grooves made in the field shall be measured using a "go/no-go" gauge, vernier or dial caliper, narrow-land micrometer, or other method specifically approved by the coupling manufacturer for the intended application. Groove width and dimension of groove from end of pipe shall be measured and recorded for each change in grooving tool setup to verify compliance with the coupling manufacturer's tolerances. Grooved joints shall not be used in concealed locations.

3.1.4 Installation of Valves

3.1.4.1 Manual Valves

Valves shall be installed in a valve box extending from grade to below valve body, with a minimum of 100 mm cover measured from finish grade to top of valve stem. Valve boxes shall be located in mulched areas. All quick coupler valves shall be located in valve boxes.

3.1.4.2 Automatic Valves

Valve shall be set plumb in a valve box extending from grade to below valve body, with minimum of 100 mm cover measured from grade to top of valve.

Automatic valves shall be installed beside sprinkler heads with a valve box.

3.1.4.3 Drain Valves

Entire system shall be manually or automatically drainable. Low points of system shall be equipped with drain valve draining into an excavation containing 0.03 cubic meter gravel. Gravel shall be covered with building paper then backfilled with excavated material and 150 mm of topsoil.

3.1.5 Sprinklers and Quick Coupling Valves

Sprinklers and valves shall be installed plumb and level with terrain. Bubbler heads shall be permanently installed 75mm to 100mm above mulch bed material for shrubs and trees and within the backfilled area adjacent to the root ball. Trees shall have a minimum of two to three bubblers per tree and shrubs a minimum of one bubbler per shrub. Junipers, Groundcovers and ornamental grasses shall be sprinkler watered with pop-up type heads which rise above the material when watered. Lawn grasses shall be sprinkler watered with the largest radius spray heads that space permits. Keep the spacing between heads as uniform as possible. Space heads in a triangular spacing pattern for best coverage. Use head to head spacing for the heads as recommended by the manufacturer. Heads shall be placed in corner areas. Install heads with an adjustable radius to reduce the radius from those recommended by the manufacturer. Use the appropriate type nozzles for the space to be sprinkled. Place sprinklers so that sprays do not spray onto walks, drives, or pavements. Use similar type and pressure sprinkler heads on each section controlled by a valve.

3.1.6 Backflow Preventers

Backflow preventer shall be installed in new connection to existing water distribution system, between connection and control valves. Backflow preventer shall be installed with concrete pads.

3.1.6.1 Reduced Pressure Type

Pipe lines shall be flushed prior to installing reduced pressure device; device shall be protected by a strainer located upstream. Device shall not be installed in pits or where any part of device could become submerged in standing water.

3.1.7 Control Wire and Conduit

3.1.7.1 Wires

Low voltage wires may be buried beside pipe in same trench. Rigid conduit shall be provided where wires run under paving. Wires shall be number tagged at key locations along main to facilitate service. One control circuit shall be provided for each zone and a circuit to control sprinkler system.

3.1.7.2 Loops

A 300 mm loop of wire shall be provided at each valve where controls are connected.

3.1.7.3 Expansion and Contraction

Multiple tubes or wires shall be bundled and taped together at 3 m

intervals with 300 mm loop for expansion and contraction.

3.1.7.4 Splices

Electrical splices shall be waterproof.

3.1.8 Automatic Controller

Exact field location of controllers shall be determined before installation. Coordinate the electrical service to these locations. Install in accordance with manufacturer's recommendations and NFPA 70.

3.1.9 Thrust Blocks

Concrete shall be placed so that sides subject to thrust or load are against undisturbed earth, and valves and fittings are serviceable after concrete has set. Thrust blocks shall be as required.

3.1.10 Backfill

3.1.10.1 Minimum Cover

Depth of cover shall be 300 mm for 32 mm (1-1/4 inch) pipe or smaller; 450 mm for 40 to 50 mm (1-1/2 to 2 inch) pipe; 600 mm for 65 mm (2-1/2 inch) pipe or larger; 1000 mm for pipes under traffic loads, farm operations, and freezing temperatures; and 450 mm for low-voltage wires. Remainder of trench or pipe cover shall be filled to within 80 mm of top with excavated soil, and compact soil with plate hand-held compactors to same density as undisturbed adjacent soil.

3.1.10.2 Restoration

Top 80 mm shall be filled with topsoil and compacted with same density as surrounding soil. Lawns and plants shall be restored to match existing.

3.1.11 Adjustment

After grading, seeding, and rolling of planted areas, sprinkler heads shall be adjusted flush with finished grade. Adjustments shall be made by providing new nipples of proper length or by use of heads having an approved device, integral with head, which will permit adjustment in height of head without changing piping.

3.1.12 Cleaning of Piping

Prior to the hydrostatic and operation tests, the interior of the pipe shall be flushed with clean water until pipe is free of all foreign materials. Flushing and cleaning out of system pipe, valves, and components shall not be considered completed until witnessed and accepted by Contracting Officer.

3.2 FIELD TESTS

All instruments, equipment, facilities, and labor required to conduct the tests shall be provided by Contractor.

3.2.1 Hydrostatic Pressure Test

Piping shall be tested hydrostatically before backfilling and proved tight

at a hydrostatic pressure of 1034 kPa (150 psi) without pumping for a period of one hour with an allowable pressure drop of 35 kPa (5 psi). If hydrostatic pressure cannot be held for a minimum of 4 hours, Contractor shall make adjustments or replacements and the tests repeated until satisfactory results are achieved and accepted by the Contracting Officer.

3.2.2 Operation Test

At conclusion of pressure test, sprinkler heads or emitter heads, quick coupling assemblies, and hose valves shall be installed and entire system tested for operation under normal operating pressure. Operation test consists of the system operating through at least one complete programmed cycle for all areas to be sprinkled.

3.3 FRAMED INSTRUCTIONS

Framed instructions containing wiring and control diagrams under glass or in laminated plastic shall be posted where directed. Condensed operating instructions, prepared in typed form, shall be framed as specified above and posted beside the diagrams. The framed instructions shall be posted before acceptance testing of the system. After as-built drawings are approved by Contracting Officer, controller charts and programming schedule shall be prepared. One chart for each controller shall be supplied. Chart shall be a reduced drawing of actual as-built system that will fit the maximum dimensions inside controller housing. Black line print for chart and a different pastel or transparent color shall indicate each station area of coverage. After chart is completed and approved for final acceptance, chart shall be sealed between two 0.505 mm (20 mil) pieces of clear plastic.

3.4 FIELD TRAINING

A field training course shall be provided for designated operating and maintenance staff members. Training shall be provided for a total period of 2 hours of normal working time and shall start after the system is functionally complete but prior to final acceptance tests. Field training shall cover all of the items contained in the operating and maintenance manuals.

3.5 CLEANUP

Upon completion of installation of system, all debris and surplus materials resulting from the work shall be removed.

-- End of Section --